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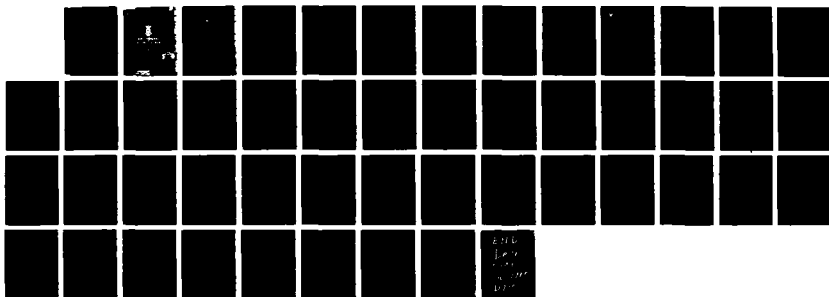
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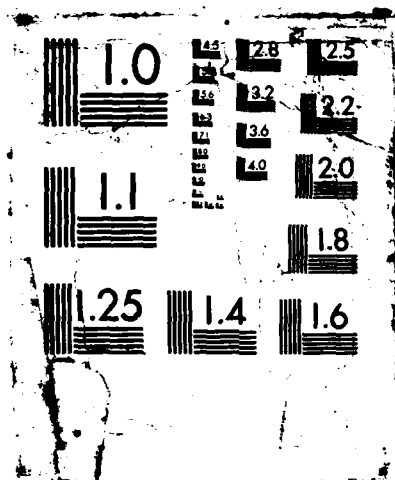
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AIR COMMAND AND STAFF COLLEGE

STUDENT REPORT

USAF FLYING SCREENING:
FIRST STEP ON THE ROAD TO WINGS

MAJ STEFAN EISEN JR.

88-0850

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TITLE USAF FLYING SCREENING: FIRST STEP ON THE ROAD TO WINGS

AUTHOR(S) MAJOR STEFAN EISEN JR., USAF

FACULTY ADVISOR MAJOR THOMAS F. VIEHE, ACSC/3822

SPONSOR LT COL RICHARD W. STOKES, HQ ATC/DOTF

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PREFACE

1. This study concentrates on the USAF flight screening process for Undergraduate Pilot Training. With the high cost of training, every pilot training attrit represents an expensive outlay in lost resources. To reduce attrition and save resources, any effective, efficient process that would better identify pilot candidates with a poor potential for completing pilot training would be beneficial to the USAF. By identifying poor risks early, and preventing their entry into UPT, pilot training attrition rates should go down. To achieve this goal of improving the USAF flying training screening program, the study sought to make improvements by studying the flying training screening programs for West Germany, Great Britain, Canada, Israel, and the US Navy. In outlining these programs, individual program features were highlighted and compared, looking for ideas in their programs which, if adopted by the USAF, would improve the program's potential for effectively screening for pilot candidates.

2. The author would like to acknowledge several superb officers who spent many hours either on the telephone answering questions or searching through their files to provide the author with the needed information to complete this study. Special appreciation goes out to the following international and American officers: Lt Col Shamsi Kiedar, Israeli Air Force; Squadron Leader William Hartree, Royal Air Force; Maj Hans-Holger Goerz, German Air Force; Maj Beth Solesby, USAF; Maj Phil Vallelunga, USAF exchange officer with the Canadian Forces; Lt David Kennedy, US Navy; and Capt Glenn Gilpin, USAF for their valuable support and information.

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ABOUT THE AUTHOR

Major Stefan Eisen Jr. is a 1976 USAF Academy graduate with a Bachelor of Science in Geography. After commissioning on 2 Jun 1976, he attended Undergraduate Pilot Training (UPT) at Columbus AFB, MS. Upon graduation, he was selected as a T-38 instructor pilot and completed Pilot Instructor Training (PIT) at Randolph AFB, TX. His initial instructor duty was in the Fixed Wing Division, 80th Flying Training Wing (FTW), Sheppard AFB, TX. The Fixed Wing Division provided fixed wing qualification training to USAF helicopter pilots. After 18 months as an instructor pilot, Major Eisen was assigned to German Air Force (GAF) PIT, 88th Flying Training Squadron (FTS), 80th FTW. The GAF PIT mission was to provide instructor upgrade training to German, Dutch, and American instructor pilot candidates prior to their assuming duties in the GAF UPT program. In June of 1981, he was assigned to the 80th FTW T-38 Standardization and Evaluation (Stan/Eval) division where he served as the wing Runway Supervisory Unit Training and Standardization Officer and T-38 Flight Examiner for the 80FTW as it was transitioning from the GAF/Dutch UPT program to Euro-NATO Joint Jet Pilot Training (ENJJPT).

In October 1982, Maj Eisen was reassigned as an Air Staff Training (ASTRA) Officer to HQ USAF in the USAF Academy liason office (AF/MPPA). Later during the ASTRA tour, he was assigned as an action officer in Program Requirements (AF/MPPR). He was responsible for briefing both the Director of Personnel Programs (AF/DPP) on all Air Staff Board activities and the Deputy Chief of Staff for Manpower and Personnel (AF/MP) on all Air Force Council activities.

In October 1983, Major Eisen was assigned as a T-38 PIT instructor pilot, 560th FTS, Randolph AFB, TX. In the 560th FTS, He served as instructor pilot, upgrading new instructor candidates in the T-38. Additionally, he served as executive officer to the squadron commander, directing and supervising the squadron's administrative and staff operations. Also, Major Eisen served as flight commander, directly supervising the training operations and instructor quality for his flight.

After two years in the 560th FTS, Major Eisen was assigned to HQ Air Training Command (ATC) Stan/Eval as a command T-38 flight examiner, responsible to the ATC Director of Operations for the evaluation and rating of all T-38 training operations in ATC. He also served as the command's testing officer. In this

capacity, he was responsible for the development of all command written testing for the T-38 instructor pilot force. Also, he served as the ATC T-38 system's representative to USAF Air Logistics Command, ensuring the integrity of the T-38 Dash 1, an operators manual used daily by over 800 instructor pilots and 1500 students. Finally, he was the command supervisor for the Buddy Instructor Pilot training program, a program which seasons the new instructor pilots during the first six months of their tour. Major Eisen served for two years on the stan eval team before attending Air Command and Staff College as a member of the class of 1988.

Major Eisen is a senior pilot with over 2400 total flying hours, 2000 of which are as a T-38 instructor pilot or flight examiner. He also has been awarded a Master of Science degree in Systems Management from St. Mary's University, San Antonio, TX.

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EXECUTIVE SUMMARY



Part of our College mission is distribution of the students' problem solving products to DOD sponsors and other interested agencies to enhance insight into contemporary, defense related issues. While the College has accepted this product as meeting academic requirements for graduation, the views and opinions expressed or implied are solely those of the author and should not be construed as carrying official sanction.

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REPORT NUMBER 88-0850

AUTHOR(S) MAJOR STEFAN EISEN JR., USAF

TITLE USAF FLYING SCREENING: FIRST STEP ON THE ROAD TO WINGS

I. **Purpose:** To improve the USAF flying training screening process by integrating positive features from several allied flying training screening programs.

II. **Problem:** Attrition rates in USAF Undergraduate Pilot Training are too high due in part to the high potential eliminatees entering the pilot training system. Attrition rates can be reduced by adopting improved screening processes, and reducing the number of high potential eliminatees from entering the training program.

III. **Data:** The data phase of the study was broken down into three sections. First, a general background was developed on how generic screening programs are developed and their uses. Next, the flying training screening programs of West Germany, Great Britain, Canada, Israel, and the US Navy were researched to provide insight on how other pilot training systems selection standards and screening processes work. Finally, the USAF OTS, ROTC, and Academy screening programs were reviewed to provide an information baseline.

IV. **Conclusions:** The screening systems vary greatly in scope and size. Some programs screen exclusively for pilots, while others screen for both pilot and officer qualities. Age standards vary, but they tend to be driven more by the requirement for education than any other factor. Education standards range from

high school only (Israeli AF) to mandatory college degrees (West Germany and the USAF). Aptitude, medical, and physical standards are quite similar, with the exception of the Israeli program, which placed extraordinary physical demands on their candidates. The Israeli AF also makes extensive use of both paper and pencil psychological tests as well as personal interviews to profile the candidate's motivation. It is the most extensive of all the psychological screening programs. In the arena of psychomotor screening, the USAF has an advanced system that is awaiting final validation testing. It holds considerable promise in economically screening candidates for basic coordination skills. The hands on flying screening programs ranged from none for the US Navy to a 63 hour primary program for the British. The prime factors in each country's flying time formula are the resources available, both in money and manpower, to conduct the operations. Finally, many of the screening programs conduct short term training during the screening process that the USAF does not accomplish. Survival training, aviation physiology, chamber flights, and egress training are some examples. Overall, they are similar programs, but each with distinctive markings.

V. Recommendations: Six recommendations were made. First, a task inventory needs to be accomplished to scientifically determine the behaviors needed to be a successful pilot. This would make the development of predictive tests for those desired pilot behaviors stand on firmer ground. Second, develop an accurate psychological screening system to more accurately identify the candidate's motivation. Tests that examine the candidate's adaptability to stress, moral views, goals, discipline, and mental toughness would prove beneficial in identifying poor motivational risks. Third, complete validation of the USAF's current psychomotor screening system. Fourth, expand the flying screening program to better evaluate candidate performance and predict potential. Next, examine the requirement for all pilot candidates to have an advanced degree. Studies have shown the younger pilot candidate is stronger, healthier, and more motivated. Finally, conduct more short term, low cost training during screening. The training could better identify high potential eliminatees, highlight potential medical problems, and act as a motivation check on the candidate's will to compete and complete the screening program. These recommendations, if adopted, would improve the USAF flying training screening program, leading to better identification of high potential eliminatees and a lower UPT attrition rate.

Chapter One

INTRODUCTION

With jet engines roaring in the background, Lt Doe, USAF student pilot in class SX02, reports to the Faculty Board president. The Faculty Board, convened because Lt Doe failed to solo the T-39, reviews the Lieutenant's records and listens to testimony. After careful deliberation, they recommend Lt Doe be eliminated from pilot training. A short time after the Board is adjourned, the records and recommendation are forwarded to the wing commander. He reviews the information and concurs with the faculty board's recommendation. Lt Doe must now pursue another Air Force career path. This scenario occurs over and over again throughout the year at all 5 USAF Undergraduate Pilot Training (UPT) bases and at Euro-Nato Joint Jet Pilot Training (ENJJPT). These losses are a significant drain on limited USAF training resources, both in dollars and manpower. Included in the high training cost of each pilot are these costs associated with lost training due to elimination. The FY87 USAF UPT attrition rate was 36.9%. [34:--] This attrition rate is up over 50% from the FY92 figure of 23.7% and up over 300% from the FY79 figure of 10.7%. [27:2] Of the 2020 student entries in FY87, 746 were eliminated with 531 lost due to flying training deficiencies, five to academic difficulties, 76 to medical factors, 58 to manifestations of apprehension, and five self-initiated eliminations. [24:--] In FY87, the dollars lost to training eliminations averaged over \$67,000 per student. [4:22] This \$67,000 figure is up over 50% from the FY79 cost of \$48,000 per student. [27:1] But other factors are also impacted when Faculty Boards convene.

It is easier to quantify the direct cost (\$67,000) of Lt Doe's training than it is to calculate the non-dollar system impacts. These impacts affect both the Air Force and the pilot training eliminatee. To convene the Faculty Board, a small army goes into motion. Besides the School Secretary's and the Class Commander's administrative workloads, instructor pilots, flight commanders, section commanders, operations officers, and squadron commanders have numerous hours consumed before, during, and after a Faculty Board. Table 1 summarizes a typical example of the workload associated with a Faculty Board.

Multiply these manhour efforts times the average 2-3 (sometimes up to 10) Faculty Boards a UPT base handles per week, and the workload impact becomes significant. (31:--)

Additionally, there are uncalculated hours spent collecting records such as military training folders, medical records, student gradebooks, and other related materials. (31:--)

Flight Surgeons and their medical staffs, optometrists, and judge advocates and their legal staffs get involved in the Faculty Board process. Although their manhour contributions are not accurately tabulated, the hours they spend on the Faculty Board can only decrease their focus on their primary mission in the flying training wing they serve. And the calculations continue into other areas outside the immediate flying training environment. There are also psychological and financial effects on the family as well as USAF personnel systems costs, both in manhours and dollars.

Position/Job Title	Type of Work Performed	Time Required (Approx. Hours)
School Secretary	Administrative	4
Class Commander	Administrative	4
	Counseling	1
Director of Operations	Review	1
Operations Staff	Administrative and Review	3
Faculty Board President	Supervision and Board Action	4
Faculty Board Members (2)	Board Action	4
Faculty Board Recorder	Administrative	3
Flight Line Supervisors (4)	Administrative Review and Board Preparation	3

Table 1. Typical Manhour Requirements for a USAF UPT Faculty Board (31:--)

Family aftershocks due to attrition are a real part of the overall picture when a student pilot is eliminated from training. To the eliminee, a failure to succeed in such a success oriented program is a strong emotional blow. Also, families must be moved, and sometimes children must change schools in mid-semester. The spouse's job may also be affected. Additionally, both the member and the USAF must usually pay for another PCS. The combination of all the above costs and impacts, in dollars, manhours, system effects, and family disruption could be decreased if the attrition rate was reduced. This challenge of reducing the UPT attrition rate while still graduating a quality product has several potential areas of investigation.

The investigation can focus on two areas, the training system and the trainee. One is the process, complete with books, instructors, simulators, aircraft, and a syllabus. The other is the subject. The focus of this paper is how we annually screen the pool of available candidates to determine who will attend UPT.

STATEMENT OF THE PROBLEM

Attrition rates in USAF UPT are high due in part to high potential eliminees entering the pilot training system. A high potential eliminee is a student who has a low probability of completing the training program leading to qualification. (35:--)
Attrition rates can be reduced by adopting improved screening techniques and reducing the number of high potential eliminees from entering Undergraduate Pilot Training.

RESEARCH APPROACH

This research required four phases. First, a generic overview of what a screening program accomplishes is outlined. Second, the flying training screening programs of four nations (West Germany, Great Britain, Canada, and Israel) and the US Navy will be highlighted to examine their respective processes. Then, the current USAF flying training screening programs, to include Reserve Officer Training Corps (ROTC), Officer Training School (OTS), and the United States Air Force Academy (USAF), will be reviewed to create an information base. Finally, comparisons are drawn and recommendations made as to which features from the other flying training screening programs could prove beneficial to the USAF UPT flying training screening systems in providing a better process, which should reduce attrition and diminish the adverse impacts on the system.

RESEARCH LIMITATIONS

A pilot training system includes the training process and student selection process. This research project is limited to the student selection process. Additionally, allied information is limited to that available either through direct translation or through an intermediary. In some instances such information was considered sensitive and access was limited. Additionally, due to the fluid nature of the screening systems, the research addresses information available prior to 31 January 1988.

Chapter Two

AN OVERVIEW OF SCREENING SYSTEMS

Without a discussion of what occupational screening and particularly flying training screening does and why it is useful, the remaining discussions would fail to have a reference baseline. This chapter will give a basic job screening outline and provide some background on the current methodology of how candidates for flying training are generally selected.

For screening of any type to be effective, a process must be undertaken. First the required task to be performed must be analyzed to determine what skills are needed to accomplish the particular task. [1:43] The task requirements can be broken down to fit either the cognitive, physical, or motivation categories. [1:41] To accomplish any given task, the subject must exhibit a certain combination of brains, brawn, and desire in order to be successful. As an example, the task of installing a windshield in a car on an assembly line has several requirements. Table 2 summarizes the major sub task requirements following the Critical Incidents Technique [CIT]. It would not be practical, nor safe, for each potential employee to test for the job on the assembly line. Rather, from those above job requirements, devices, measurements, or methods are devised to test candidates and reasonably predict their future success on accomplishing the task. A general skills test, eye-hand coordination test, physical strength and dexterity exam, mock up simulator test, or other options are available either singly or in combination to help predict task accomplishment success. [2:82-86]

From this simple example arises a complex issue for an air force contemplating a flying training screening program that selects candidates for flight training. A detailed, task inventory of what it takes to fly an aircraft has, for several reasons, never been conducted. [35:--] First, flying is a careful and complex orchestration of cognitive, physical, mechanical, and motivational attributes and skills that are difficult to categorize using such conventions as the Critical Incident Technique [CIT] illustrated above or others such as the Position Analysis Questionnaire [PAQ] or Functional Job Analysis [FJA]. [1:43-48] Second, if such an extensive task was undertaken, the

program cost and time required to accomplish this project would strain resources. [39:--] Additionally, the task of flying has a myriad of subjective qualities both difficult to identify and quantify on a predictive test. These subjective qualities, from what is good situation awareness to what constitutes a good landing, are much more difficult than the objective analysis of, for example, what constitutes straight and level unaccelerated flight. Another reason a comprehensive task inventory has not been accomplished is due to the changing nature of military aviation. [35:--] Technology has introduced new requirements of today's pilot, both physical and mental that have never existed before. Computerized fire control systems force pilots to simultaneously act as navigator, flight engineer, and weapons controller while evading an ever sophisticated battlefield defense. [39:--] Physically, the sustained energy ability of today's aircraft put new stresses on an already taxed human system. [39:--] This dilemma of needing a screening system but not having accurately defined the standard pilot's job profile under any convention has made development of a predictive test or series of tests difficult. Without such information, the flight screening system has evolved under a compromise.

Activity	Cognitive	Physical	Motivation
1. Lift and support 35 pounds (weight of windshield)		X	
2. Eye hand coordination to maneuver windshield into proper position	X	X	
3. Judgement to determine when aligning marks are correct	X		
4. Concentration ability to work in a noise filled environment	X		X
5. Sustainability to working with an acceptable success rate			X

Table 2. Critical Incidents for Windshield Installation [2:96]

This difficult target, both to define and to hit, has resulted in creating a generalized series of task requirements. These requirements are based on quantitative analysis where able. However, a large portion of the system has evolved based on experience on what it takes qualitatively to be a successful pilot. In that vein, flight training candidates have traditionally been selected not only on objective measures such as tests centered around mental ability, health, strength, and coordination, but subjective evaluations of motivation, leadership and adaptability to stress. [35:--] In addition to the difficulty in performing an accurate job analysis and then using that data to develop predictors, the tests designed must accurately select candidates who show promise of future success. [1:153]

Predictive tests follow two basic patterns of logic. The first pattern uses a test to identify those with a low probability of success (high potential eliminee). The second pattern seeks those with a high probability of success (low potential eliminee). It is easier to predict failure (high potential eliminee) than success (low potential eliminee). [35:--] In the former, all that needs to be done is to spot the candidate who lacks the fundamentals. The problem arises only where to set the minimum satisfactory standard. Rather like culling out the chaff instead of searching for the wheat. The later track is harder to accomplish, for the candidate displays the requisite abilities, and identifying the minimum score that will predict job success is difficult to assign. [35:--]

The reasons for screening and developing whatever method to screen potential candidates are simple. Screening primarily conserves resources. With only finite time, money, equipment, and people, screening is required to reduce the entire interested pool to a manageable number of low potential eliminees. With thousands of candidates annually applying for USAF pilot training through several avenues, not screening the applicants would simply overcrowd the system. Additionally, safety dictates only those with a reasonable chance of success should expose themselves to such a hostile and demanding environment.

Chapter Three

OUTLINE OF SERVICE SCREENING

The previous chapter outlined what screening seeks to do, how the methodology works, and the reasons why it is useful. This chapter will provide a summary of the flying training screening programs for five programs: four allied nations and the US Navy. West Germany, Great Britain, Canada and Israel were chosen for several reasons. First, they produce polished professional military aviators. (28:24) Second, they exhibit western value systems and societal norms. Third, the pilot graduates perform like tasks in similar aircraft, making their user requirements parallel the USAF's. Finally, there is enough diversity in their social and political makeup to reflect in their screening processes and therefore allow for comparisons, and each screening system, although similar to others in some ways, has unique characteristics.

Radical societies and unconventional societal norms were avoided because these radical behaviors tended to create screening systems that would be impossible to implement in the United States. For instance, a fundamentalist Islamic dictatorship would produce screening processes based on religious beliefs, an unconstitutional policy in the US. Additionally, the study concentrates on those systems producing reasonable numbers of their own pilots rather than systems depending on another country to provide all their training.

WEST GERMANY

Throughout military aviation's short history, German pilots have dominated page after page. Out of this colorful aviation heritage, the West German male (currently there are no females in the aviation ranks) competes for flight training. All pilot candidates, whether German Air Force (GAF) or Federal German Navy (FGN) go through very similar flying training screening processes. (33:--) In the interest of efficiency, this review will concentrate only on the GAF flying training screening process.

The GAF has two primary screening classifications. Candidates may either enter directly to the active forces or seek sponsorship to the Armed Forces University prior to entering the active forces. Regardless of track, all GAF officers have an advanced degree. Additionally, candidates entering directly from the civilian ranks may also choose from either a fly only career, with mandatory retirement after 20 years, or a full career track which closely resembles a USAF officer's career path. [23:2]

In either track, screening begins with a review of the candidate's records, and an interview. A battery of cognitive skills and mental aptitude tests are also administered. The test battery subjects are summarized in table 3. The candidate is also administered a medical exam and a physical strength and dexterity test. Currently, the GAF does not have psychomotor screening or psychological testing. After completing the initial screening, the Armed Forces University candidate attends school and the civilian university graduate candidate attends the GAF commissioning school [OSLW]. [33:--]

Verbal Aptitude	Mechanical Aptitude
Cognitive Skills	Aircraft Instruments
Spatial Orientation	English Language

Table 3. GAF Aptitude Test Battery Subjects [33:--]

The Armed Forces University is a unique school, not at all like the US service academies. The Armed Forces University is a three year federally funded facility emphasizing technical degrees taught in a civilian academic atmosphere. The interservice school does not conduct military training, and awards advanced degrees to graduates, who then receive their commissioning training at OSLW. [33:--] The only requirement of the GAF candidates is that they earn a Private Pilot License [PPL] during their undergraduate studies at the Armed Forces University. The PPL school is, like the university, a civilian operation that is federally funded. [23:3]

OSLW, the GAF equivalent of USAF OTS, is a six month commissioning program involving extensive class and field work. The curriculum covers physical education, leadership and followership laboratories, studies of the GAF structure,

military indoctrination, and land and sea survival training. [33:--] Additionally, they receive physiological training to include chamber flights and egress training. The candidates are rated on individual and group performance and are subject to reviews before graduation and commissioning. After commissioning, the candidates attend a four week flying training screening program at Fuerstenfeldbruck Air Base, Germany. [33:--]

Civilian university graduates follow a similar track, except their initial screening and testing does not occur until they apply for OSLW. The civilian school candidates go through the same OSLW commissioning program as the Armed Forces University graduate but attend a longer, six week flight screening program at Fuerstenfeldbruck, for few civilian school graduates possess a PPL. [33:--]

The Fuerstenfeldbruck flying training screening program consists of academic classes and flight screening. Academics cover navigation, aircraft engineering, aircraft instruments, air traffic control, principles of flight, and weather. [23:8] The flying syllabus consists of 22 flying hours in the six week program with an opportunity for one solo. [23:7] The Piaggio P-149D, a propeller driven, low wing primary trainer is used to introduce the candidate to the flying basics. Emphasis is on basic aircraft control, stalls, and traffic patterns. The syllabus also requires the candidate be evaluated for his resistance to stress, both during airborne operations and ground training. The candidate's aggressiveness, learning curve, and tendencies towards airsickness are also observed. [23:3] At the end of the flight program, a quality check ensures candidates meet the program's minimum flying requirements. After the check, a final board assesses overall academic and flying performance points and makes recommendations to the Wing Commander. The wing commander is the final approval authority. Once approved, the candidate is retained in Germany for transport training or sent to the ENJJPT program for training leading to a fighter assignment. [33:--] Both the flying screening program and GAF ENJJPT attrition rates average 30%. [33:--]

GREAT BRITAIN

The Royal Air Force's flying training screening process is centralized under the RAF Support Command. Candidates fall into three categories. The first category, the Direct Entrant, is a non-advanced degree holder seeking an aviation career. The minimum education requirement is a rough equivalent of the US high school diploma. Both the second and third categories are related to higher education. The University Cadet Candidate does not yet have his degree but wishes to compete for a flight training slot while still in school. The Graduate Direct Entrant is a university graduate, much like a US OTS candidate. [36:--]

The Officers and Aircrew Selection Centre at Biggen Hill administers the entire flying training screening process. The aircrew selection branch is separate from the others, and conducts each screening session over a two and one half day period. After the initial records review, the candidate is scheduled for aptitude testing, coordination testing, leadership exercises, a medical exam, and an interview. [11:4] The aptitude test subjects are summarized on table 4.

Aircraft Instrument Reading	Symbol Recognition
Mathematical Abilities Test	Scientific Comprehension
Mechanical Comprehension	Verbal Comprehension

Table 4. RAF Aptitude Test Battery Subjects [11:6]

After testing, a specially trained RAF officer team psychologically profiles the candidate through an interview. The session covers questions on the subject's background and motivation to join the RAF. Also, current affairs are covered to determine the subject's knowledge of world affairs and their personal political views. [11:8]

Additionally, a computer generated psychomotor test is used to evaluate reaction speed, sense of timing, and coordination of the eyes, hands, and feet. The system is similar to a video game and includes reaction and target following tests. The scores are machine tabulated and weighted. [36:--] In addition to these measures, the British utilize a series of exercises to determine individual skills, group abilities, and leadership. [11:8-10] The series consists of a variety of situation devices, challenging candidates to use their imagination, leadership skills, independent and group thought, oral and written communication skills, mental dexterity, and knowledge of current events. The series of five tests are summarized in table 5. The series is also designed to test physical strength, flexibility, and endurance. [11:8-10] At the conclusion of the screening, a board meets to assess scores and determine the selected candidates.

Leaderless Test:	Pits a leaderless group in an obstacle scenario: determines leadership and group organization/teamwork
Discussion Group:	Led by screening officers: discussions focus on current events/social issues. Used to determine insight, communication skills, and moral outlook.
Planning Test:	Classroom situation: a problem is presented and the team charged with developing and defending a solution. After the exercise, individuals detail the plan in writing. Test examines group creativity, leadership, logic, and written/oral skills.
Individual Test:	Exercise observes individual math sense, organized verbal thought, and mental dexterity in answering questions. Test has a candidate solve a math skills problem. The candidate then explains his solution to an officer board and answers questions.
Command Situation:	The candidate is isolated and presented with an obstacle situation. After allowing time to develop a solution, the remainder of his group is brought in. The leader briefs the solution and guides the group to task completion.

Table 5. RAF Leadership Exercise Series [11:8-10]

Direct Entrants and Graduate Direct Entrants selected for training undergo 18 weeks of Initial Officer Training (IOT), much like the USAF OTS school. [8:4] After successful completion, the Direct Entrants and Graduate Direct Entrants without University Air Squadron (UAS) experience spend the next 16 weeks in Elementary Flying Training (EFT), consisting of 63 hours in the Chipmunk. [9:2] Direct Entrants or Graduate Direct Entrants with a Private Pilot License only receive a 30 hour program. Graduate Direct Entrants with UAS experience go directly from IOT to Basic Flying Training (BFT) in the Jet Provost. [12:6] The 63 hour Chipmunk Flying program is a recent innovation. [36:--] The previous program consisted of a 14 hour Chipmunk program designed strictly for screening. The British found the 14 hour program was only successful in screening out only the poorest of performers,

many of which were identified as poor risks by other parts of the flying training screening program [36:--] The expanded program trains as well as screens. All basic acrobatics are taught, as well as basic instruments and navigation skills. Flying screening academic subjects are summarized in table 6.

Aerodynamics	Aircraft Engineering
Military Airmanship	Communications
Flight Instruments	Air Traffic Control
Aviation Physiology	Weather
Navigation	

Table 6. RAF Flight Screening Academics [24:16-19]

The new program is experiencing a 25% washout rate, but follow-on training in BFT has an attrition rate averaging 5%. Previously, the rate had averaged 21% in BFT. [36:--]

University Cadets attend college and are assigned to a University Air Squadron. The UAS is an RAF extension organized somewhat like ROTC, however, the emphasis is on flying. With approximately 20 Bulldog aircraft assigned per UAS, University Cadets will receive 90 training hours over a three year period. [13:9] Since UC's don't receive military training, in the sense of USAF ROTC, the UAS graduate must first undergo IOT, then report directly to BFT. [12:6]

CANADA

The Canadian Forces (CF) shares its heritage with the RAF. It's structure is similar, with the entire screening process centralized in Ottawa. The Canadian Forces Aircrew Selection Centre (CFASC) controls all administration and scoring. [21:10] This affords the CF a high degree of standardization, critical for political purposes. The society it draws from requires this standardization due to it's two language culture, French and English. This cultural difference has spawned a requirement to develop a screening program geared to bridge two cultures and two languages. [40:--]

Like the RAF, the CF have no advanced degree requirement. All candidates undergo the same screening process. The initial screening consists of a civil records review, medical exam, and physical strength test. All candidates are then administered an aircrew specialty test battery consisting of written and coordination examinations. [40:--] The written test battery is composed of several examinations, each focusing on different cognitive skills. The English speaking candidates take eight tests, the French primary language candidates take nine. [21:3-3] Table 7 summarizes the tests.

- | | | |
|----|-------|---|
| 1. | AN2 - | Arithmetic reasoning/knowledge |
| 2. | TR2 - | Ability to interpret written technical materials |
| 3. | WI2 - | Aircraft instrument readings test |
| 4. | AR2 - | Mathematical theory comprehension |
| 5. | WC2 - | Aircraft attitude recognition test |
| 6. | WT2 - | Mathematical tables interpretation test |
| 7. | AS2 - | Concentration test based on oral, rapid fire mathematical calculation questions |
| 8. | AB2 - | Numerical ability test |
| 9. | IV2 - | Verbal aptitude test [French primary language candidates] |

Table 7. CF Aptitude Test Battery
Subjects [21:annex A 2-3]

The psychomotor coordination tests are conducted in the VGAT-1. These tests use an old LINK trainer device, but make no real use of the internal avionics. Rather, it houses a mural with several readily identifiable targets. The candidate is tasked with maneuvering a "sight" on the targets using a combination of eye-hand coordination movements. The tests require the candidate maneuver the "sight" using the controls singly and in combination. The tests make no use of normal aviation skills movements, rather they test eye-hand coordination, concentration, and learning curve. A computer determines a percentage success

rate and scores accordingly. [21:5-6] After all the tests are individually scored, a composite score is generated and this result is compared to the cut-off standard. Additionally, final medical exams are administered. The entire process takes two days. [21:Annex 3 B-1]

After the ground screening is completed, the candidates with no PPL spend 27.0 hours in a C-134 Muskateer aircraft. Those with a PPL can be waived down to 22.9 hours. [7:1-1] Although the syllabus directs it to be a training syllabus, surveys reveal the program's screening ability. [40:--] The 39 day program includes academic as well as flying training. Academic training subjects are summarized in table 8. Airborne training not only covers the basics, but includes spin and aerobatic training. The final sortie is a check sortie to ensure students meet program requirements. [7:A-3/4]

Aircraft Systems	Powerplant
Aerodynamics	Flight Procedures
Basic Navigation	Weather
Flight Instruments	Communications
Aviation Physiology	Flight Safety

Table 8. CF Flight Screening Academics [7:4-1]

The student is rated both in the classroom and the aircraft on a Pass/Fail system. Any failure to progress will result in a review board. In recent years, the Muskateer attrition rate has been approximately 25%. [40:--]

Israel

The national conscription law makes the military a vital part of every male youth's life. Also, the threat proximity and intensity and the defense requirement to meet the threat is ingrained in the Israeli culture. The Israeli Air Force (IAF) and its pilots are viewed by Israeli nationals as ultimate heroes, the guardians of their nation and vanquisher of the foes that hug close on their borders. This strong nationalistic atmosphere

contributes tremendously to the social stature of the IAF pilot. [37:--]

With universal conscription drawing every 18 year old male to the armed forces, the IAF enjoys the position as the most desired service. [37:--] On the average, the IAF pilot selection board annually receives over 5,000 applications for the 200 training slots. [19:12] The IAF takes advantage of this popularity and enhances its position through a unique recruiting and screening process. The program conducts extensive information distribution and recruiting activities. They sponsor youth groups to interest teens in aviation. The program plants seeds of interest through studies in aerodynamics and aviation history as well as building flying aircraft models and sponsoring trips to IAF installations. [19:12] Later, as students progress through high school, the IAF receives complete grade reports on every male and screens them for pilot candidates. During their senior year, those students with sufficiently high enough grades in the sciences and math area are sent invitations to compete for pilot training upon graduation. [19:12-13] The average candidate is 18 years old, and a college education is not a factor due to the conscription law. Pilot candidates are initially screened through a series of tests, to include a physical strength test, medical exam, and a battery of aptitude tests. Table 9 summarizes the aptitude test subjects. Of note is the extensive amount of testing devoted to determining the candidate's psychological profile, moral outlook, and political and world events expertise. After testing, the psychological profile is further developed through an interview conducted by a psychiatrist. The interview involves general questions on motivation and personal goals as well as having the candidate respond to questions on current events and social dilemmas to determine the candidate's beliefs and character. [37:--] After the interview, the candidate undergoes the eye-hand coordination test. The test is conducted on a manual apparatus where the candidate maneuvers a "ball" around an unsymmetric path using two control sticks. The left hand control stick manages the ball's vertical path and the right hand control manages the horizontal path. The test rates both time for completion and percentage success for keeping the ball on the predetermined course. The IAF is proposing to upgrade this system soon with a computer controlled video device. [37:--] After the testing is completed, composite scores are compiled, with the aptitude and coordination tests receiving high weights. After the initial candidates are selected, the screening process continues, but the Army takes over. [19:15]

All candidates undergo a seven week basic military training course. The equivalent of US Marine boot camp, it consists of intense physical, weapons, and tactics training. Upon successful completion of the basic military school, it's back to the IAF for flight screening. [19:15]

Aircraft Instrumentation Test	Language Comprehension
Mathematical Comprehension	Logic
Spatial Comprehension	Psychological Profile
Mechanical Comprehension	Verbal Comprehension
Moral Evaluation	Politics
World Events	

Table 9. IAF Aptitude Test Battery Subjects [37:--]

Flight screening is conducted in a Piper Cub or equivalent as a follow on to Basic Military Training. The seven week course is designed to be a pressure program and includes 15 hours of flying with emphasis on the candidate's adaptability to the aerial environment and his spatial orientation, as well as his learning curve and task prioritization abilities. Intensive academics also accompany the flying program and cover aero, electrical engineering, math, physics, and aviation medicine. [19:14] Physical conditioning continues to be rigorous. Part of the physical training involves group leadership laboratories similar to the field laboratory at the USAF's Squadron Officer's School [Project X]. The group is given a situation and a goal and then challenged to achieve the goal in the shortest time possible. [37:--]

The actual flying program is broken down into three distinct phases. Phase one is flown with one instructor pilot and covers the first five sorties. At the end of each sortie, individual maneuver grades are assessed as well as an overall grade. Of note is the grade assigned on the candidate's ability to adapt to the aerial environment and his spatial orientation, learning curve, and task prioritization skills. At the end of the fifth sortie, the instructor pilot makes a determination, based on the candidate's sortie scores and academic and military grades, whether to continue him in the screening process or recommend elimination. A Review Board examines each candidate's records and determines whether to continue or eliminate the candidate. If continued, the sixth through the ninth sorties are flown by another instructor pilot and are graded in the same manner as the first five sorties. The tenth sortie is a program quality check flown by a designated check pilot. After completing the tenth sortie, the flight commander conducts an interview. The subjects

covered include motivation and personal goal setting. Once this is completed, the commander makes a final recommendation based not only on the candidate's sortie scores and academic and military grades, but also on the check sortie results and his qualitative assessment of the interview and the leadership laboratories. [37:--] Again, the candidate completes the program or is disenrolled through the Review Board. After flight screening, the candidate continues in his military schooling in a joint IAF and Army program. This prepratory training period is 17 weeks long, with ten weeks in IAF academic training and seven weeks in the Army's advanced military training and paratrooper school. The academic emphasis continues in classes covering structures, aero, electrical engineering, aviation medicine, weather, aircraft recognition, communications, and radio procedures. [19:15] The Army's military training revolves around platoon tactics, group problem solving, and leadership. Physical training continues to increase in difficulty until the following standards are met. A candidate must accomplish a 22 mile run in three and one half hours and a 46 mile march in 11 hours. Comprehensive survival skills training is conducted, culminating in accomplishing a 55 mile escape and evasion survival task in 22 hours. Intertwined with this training is paratroop school, consisting of ground training and seven jumps, the last one at night which starts the 55 mile survival exercise. [19:16]

Instructor pilots assign not only flying skill grades, but also qualitative and quantitative grades on the candidate's demonstrated leadership, communications, followership, and teamwork skills. [19:17] Additionally, the instructor pilots conduct group discussions on current events and moral issues to observe and record each candidate's knowledge level and communications ability. A final weighted score from the leadership lab and the group discussions are a combination of the instructor's evaluation and the candidate's peer ratings. [37:--]

The screening program is complete at the end of this event, and successful candidates continue on into pilot training. Those unsuccessful candidates are recategorized into other fields for the remainder of their conscription commitment. The IAF historically experiences high attrition rates in both flight screening and pilot training. Attrition rates sometimes reach over 50%. However, their unique force structure requirements allow them to be very selective in who eventually qualifies as a pilot.

US NAVY

The US Navy flying training screening programs consist of the the Naval Academy and the Aviation Officer's Candidate School (AOCS). To streamline the research effort, only the AOCS flying training screening program will be observed.

The Navy's initial application requirements are very similar to the USAF's. The applicant however, need not have a college degree. [38:--] Although most candidates do, the Navy allows applicants with as little as two years of college credit to enter the Naval Aviation Cadet (NAC) program. The NAC program's mechanics are identical to the traditional college graduate program, except the NAC does not receive a commission until after they complete both AOCs and Naval Aviation Training and receive their wings. [38:--]

Once through the initial review, candidates are administered an aptitude test battery. Applicants are administered the Academic Qualifications Test and the Flight Aptitude Rating test batteries (AQT/FAR). [38:--] Table 10 summarizes the test topics.

Verbal Aptitude	Aircraft Instruments
Math Aptitude	Technical Interpretation
Mechanical Reasoning	Spatial Orientation

Table 10. Navy AQT/FAR Aptitude Test Battery Subjects [38:--]

AOCs is conducted at Pensacola NAS, Florida. This central location allows for training standardization. Additionally, screening flows in a timely manner to meet the flying training pipeline requirements.

Upon initial arrival at AOCs, candidates undergo a medical exam. The Navy medical standards exam has two exceptions of particular note. Unlike the 20/20 vision requirement that the USAF levies on all it's candidates, the Navy can grant a Aviation Vision Waiver (AVW) to candidates with vision acuity of up to 20/50, correctable to 20/20. This restriction, however, does narrow the candidate's aviation specialties to the crew aircraft community to include P-3s, C-130s and helicopters. [38:--] The other the medical standards exception is the detail of the anthropometric measuring system. Unlike the USAF standards, the Navy determines by aircraft which the candidate is anthropometrically capable to fly. The restriction arises in part due to the physical confinement a pilot experiences during locked harness carrier launches and landings. For example, a candidate may not be able to reach all the critical controls in an A-7 but be able to function properly in the F-14. This

restriction, Not Physically Qualified (NPQ), is progressive in nature, limiting eligibility to individual aircraft types rather than entire aircraft classes. [26:1] In addition, aviation physiology training is also conducted at AOCs. The physiological training introduces the candidates to spatial disorientation and helps identify those prone to motion sickness. [38:--]

The 14 week AOCs school primarily centers on academics and military training. These classroom and field rigors in themselves are considered the second phase in the screening process. Academic and leadership skills, physical strength, mental dexterity, and other factors are taught and evaluated. Academically, classes are conducted in nine subjects, summarized in table 11.

Navy Organization and Operations	Navigation
Navy Administration	Aerodynamics
Airframe and Powerplant Engineering	Seamanship
History of Naval Seapower	Naval Law
Naval Leadership Course	

Table 11. AOCs Academic Subjects [38:--]

Military discipline is also emphasized, exposing candidates to the regiment required to meet Naval Aviation School training standards. Physical conditioning and water survival skills put pressure on the candidates in a controlled field environment. By the end of AOCs, candidates must have completed a one mile swim in a flight suit in less than 80 minutes. Additionally, the cross-country course involves a one and one-half mile run through the sand. Failure to meet standards eliminates the candidate from training. [26:2] In addition, aircraft water survival techniques are taught. The laboratory consists of an underwater aircraft escape trainer nicknamed the "Dilbert Dunker". The system simulates the disorientation associated with a water ditching. The "Dilbert Dunker" exposes candidates to this aviation physiology hazard and tests their ability to cope with an uncomfortable and disorienting situation. [38:--]

Leadership qualities are measured by both the candidate's instructor and peers. Laboratories like drill, inspections, and the obstacle course challenge the candidate's teamwork skills and leadership abilities. To measure this, an Officer Like Qualities (OLQ) score is determined by a composite of both the candidate's peer ratings and a score assigned by the instructor. The ratings look at the candidate's attitude, motivation, leadership, and teamwork skills. Peer ratings and the instructor's assessment are given equal weight in the score. (26:Attch 1) Additionally, a weighted score is added based on the instructor's interview with the candidate. The interview questions center on the candidate's motivation and personal goals. These various leadership and officer qualities are considered critical by the AQCS. Forty percent of the final score determining the candidate's suitability for commission and training comes from the leadership score. (30:Enclosure 1)

The Naval flight training screening system does not feature either psychomotor testing or a hands-on flying screening program. The first time the candidate flies is after he finishes AQCS and enters primary training in the T-34 Mentor at either Whiting Field, Florida or Corpus Christi, Texas. (38:--)

Chapter 4

USAF FLIGHT SCREENING PROGRAMS

There are three primary screening processes the USAF uses to select candidates for pilot training. These are Officer Training School (OTS), Reserve Officer Training Corps (ROTC), and the United States Air Force Academy (USAF A). Each program first seeks to profile the successful UPT candidate and then select from the applicant pool those candidates that most closely fit the desired profile to attend UPT. Even though their end goal is identical, their processes vary in scope and size. For this reason, each screening process will be outlined separately.

Officer Training School

Officer Training School at Lackland AFB, Texas, conducts both flight screening and officer training during a 120 day training cycle. The school has several prerequisites for initial application, among them the requirement for the candidate to possess a college degree. Because of its single location, screening is accomplished in a standardized manner and the timely process allows successful candidates to transition into UPT with minimum delay.

Prior to reporting to OTS, candidates first undergo a medical exam and AF Officer Qualifying Test (AFOQT) testing. The test measures aptitudes used for selecting candidates for commissioning training programs. (35:--) The bank consists of 16 different tests; pilot candidates take eight. Table 12 outlines the required tests.

After qualifying and arriving at OTS, but prior to starting officer training, pilot candidates undergo Portabot testing and Flight screening. Portabot psychomotor testing is a computerized video device and very similar in structure to an arcade video game. Two different tests are administered, both prior to the flying portion of the screening process. Portabot tests both eye/hand coordination and the learning curve. The first test requires the examinee to keep a circular moving target within a "sight" by manipulating a stick and throttle (stick = up and

down; throttle = left and right]. [32:--] The second test involves keeping two bars, one vertical and one horizontal, within target parameters on the screen. Bars are not co-located on the screen and the flight controls offer no advantage to the person with previous pilot experience. Score is dependent on the amount of time the objective is met. [32:--] Currently, Portabat scores are used only as data to develop a validation formula for the AF Human Resources Laboratory engineers at Brooks AFB. Once validity parameters are established, the Portabat will become part of the OTS flight screening process. [5:8]

Verbal Analogy	Instrument Comprehension
Mechanical Comprehension	Block Counting
Electric Maze	Table Reading
Scale Reading	Aviation Information

Table 12. USAF Aptitude Test Battery Subjects
[AFQQT:Pilot] [35:--]

Hondo Field, Texas is the sight for OTS flight screening. The 16 day program involves nine hours of ground training and 14 hours of flying time. The syllabus is expressly a screening syllabus. [17:1] The ground training also indoctrinates the candidate on the demands of UPT by simulating a typical UPT training routine while the airwork concentrates on basic aircraft control and the candidate's ability to accept and retain instruction in the air. Ground training covers T-41 aircraft and engine systems, basic communications, navigation, and emergency procedures. Airwork stresses patterns and basic aircraft maneuvering. The program has a quality check at the end, determining the candidate's ability to perform the basic functions and maneuvers needed to pilot an aircraft. [17:11-13]

After T-41 flight screening, OTS schooling commences. The school in itself becomes another phase in the screening process as leadership skills, physical strength, mental dexterity, and other factors are taught and evaluated during the 90 day process. Military discipline is also enforced, introducing cadets to the regiment required to succeed in UPT. Physical dexterity and performance under pressure are examined in a controlled class and field environment. Successful completion signals the end of the

screening phase and admission to UPT.

ROTC

Unlike OTS, ROTC conducts standardized screening in many diverse locations. Additionally, the time span between the screening process and UPT is much greater than OTS, due to the sectionalized training and screening they receive over a period of two years or more. Candidates compete for AF ROTC scholarships at over 150 universities and colleges nationwide. [16:18-26] The selection process begins with an initial review of civil and school records and a medical examination. Local ROTC detachment officers then assess a Quality Index Score (QIS), assigning a rating to the candidate's demonstrated academic abilities. The QIS is a weighted composite of the candidate's GPA, SAT score, and a detachment commander's rating based on interviews and observations. The AFOQT (pilot) is also administered. After the scores are matrixed to determine if the candidate meets minimum requirements, all successful candidates records are sent to HQ AF/ROTC. At HQ AF/ROTC, a central selection board uses the submitted inputs to determine scholarship designees. [15:3-9] Generally, pilot scholarship contracts are offered between the sophomore and junior year. These scholarship students enter either a two year program or continue with their current curriculum if enrolled in ROTC previously. [35:--] The campus program develops military skills and motivation towards an AF career. AF ROTC military training revolves around classroom, drill, leadership lab, and summer camp activities. Flight screening is conducted after the academic year at two locations. [35:--]

The Light Aircraft Training for ROTC (LATR) is a 16 day program conducted either at the USAF OTS Flight screening facility at Hondo, Texas or Embry-Riddle Aeronautical University, Daytona Beach, Florida. [6:56] The syllabus is similar in many respects to the OTS flight screening syllabus. The 16 day training period has nine hours of academic ground training and 14 hours of flying time. [4:22] Although almost identical to the OTS syllabus in academic requirements and flying maneuver item file requirements, the LATR program not only screens, but seeks to "train and motivate participants toward a career in the AF." [18:1] Ground training simulates a typical UPT routine and the airwork concentrates on basic aircraft control and the candidate's ability to accept and retain instruction in the air. Like OTS, the ground training covers T-41 aircraft and engine systems, basic communications, navigation, and emergency procedures. [18:14] Airwork stresses traffic patterns and basic aircraft maneuvering. The program has a quality check at the end to determine the candidate's ability to perform the required functions and maneuvers needed to pilot an aircraft. [18:12-13] Successful completion signals the end of the screening phase.

After college graduation and commissioning, the candidate is placed into the UPT pipeline.

USAFA

USAFA is the third source for UPT candidates. It encompasses a four year academic, military, athletic, and aviation program that in itself can be considered a continuous screening process. Application to USAFA involves all the basic requirements to attend any institution of higher learning with the addition of a stringent medical exam, physical fitness test, and a higher weight placed on leadership activities during high school. Once at the Academy, the four years of military, physical, academic, leadership, and athletic challenges is a continuous process producing it's own attrition. Also, aviation orientation begins early and continues through all four years. Cadet aviation programs are designed to boost interest and motivate cadets to pursue aviation careers. Airmanship programs include soaring, jump training, the aero club, motivation flights in AF aircraft, and navigation training. These programs are conducted throughout the cadet's four year curriculum.

During the senior year, cadets desiring a UPT slot after graduation participate in the T-41 program. Primarily an academic school year function, it further exposes a cadet to the flightline environment they can expect in UPT. The syllabus is similar in many respects to the ROTC and OTS flight screening syllabus. It's stated purpose is "to motivate all physically qualified USAF academy cadets toward a rated career in the Air Force. To provide a selection process identifying students who possess the potential to complete Undergraduate Pilot Training (UPT) and minimize attrition of USAFA graduates in UPT." [14:2] Training simulates a typical UPT routine and the airwork concentrates on basic aircraft control and the cadet's ability to accept and retain instruction. The syllabus includes seven and one half hours of airmanship academics and 21.1 hours of T-41 flying time. [14:2] T-41 ground training covers aerodynamics, aircraft systems, and emergency procedures training. [14:20] Airwork stresses traffic patterns and basic aircraft control. The program ends with a quality check and determines the candidate's ability to perform the required functions and maneuvers needed to pilot an aircraft. [14:10] Of note is the differing Maneuver Item File (MIF) requirements between the OTS/ROTC and USAFA syllabi. The differences are summarized in table 13. Although these MIF variances exist, the differences do not extend to the more significant MIF items such as stalls and traffic patterns. After successful completion of the T-41 program, cadets complete the remaining academic and military training requirements for graduation, are commissioned, and programmed to attend UPT.

Maneuver	OTS/ROTC	USAFA
Ground Operating Procedures	G	F
Level Off	G	F
Straight-and-Level	G	F
Turns	G	F
Climbs/Climbing Turns	G	F
Glides	G	F
Trim	G	F
Throttle Technique	G	F

Table 13. OTS/ROTC vs USAFA End of Course MIF Requirements
 (Only differences are illustrated) [14:222-23; 17:12]

Chapter 5

COMPARISONS

In the preceeding two chapters, several flying training screening programs were outlined. This chapter ties them together by summarizing similarities and highlighting differences. This chapter will compare age, medical, physical, and educational standards and summarize the variables in the testing, training, and flight screening programs of the subject screening systems.

The age standards required by the various services are somewhat similar, but are driven by two prime factors. First is the desire to get as young a candidate as practical that displays the required skills and aptitude to complete the rigors of pilot training. It has been shown in several studies that, the younger the pilot training candidate, the greater the potential for success. An Air Force Surgeon General's report advocates commencing flying training by age 19. (28:25) Additionally, youth points to future success. A 1962 Air Force study found that "the younger the a pilot is when he graduates from flying school, the better his accident record in the future." (28:25) Also, a 1982 Air Training Command study supported the Surgeon General's recommendation by noting the younger the candidate, the lower his chances for attriting. (29:5) In war skills, it has also been demonstrated that the younger the combatant, the higher the resistance to combat fatigue and the greater the propensity for heroic action (3:35) Additionally, the younger the candidate, the less likely they are to have medical difficulties or develop medical conditions associated with older candidates. (35:--?) The secondary reason for the age standard is driven by the different service's educational requirements. It is natural for services requiring college degrees to get an average candidate age profile that is at least three to five years older than the services that have no advanced degree requirement. The most marked example is the age difference between the Israeli AF, where mandatory conscription creates a candidate pool of 18 year olds, and the USAF Academy's four year higher education program which generates a candidate pool of 22 year olds. Although generally the age standards are not significantly different, the reasons for the differences are noteworthy.

Medical standards probably have the smallest variance in the

overall flight training screening picture. With the exception of eyesight and a few variances in anthropometric standards, the subject programs were very similar in their medical requirements. Also, the physical strength standards are comparable, but the male exclusive screening programs tend to have higher requirements in such areas as upper body strength and stamina when compared to two gender systems. [39:--]

The various screening programs' education standards are where the first significant divergences are noted. Candidates in the Israeli AF have no higher education requirements, while Great Britain and Canada allow either high school or college graduates to compete for flight training. The US Navy now only requires a minimum of two years college credit while the USAF and West Germany require all candidates to possess an advanced degree. However, the systems do compensate for the variances in educational standards. The Israeli AF, with the lowest formal education requirement, is very selective in setting the candidate's high school grade standards and their screening program involves several quantitative and qualitative tests in both the oral and written medium that quickly identify poor academic risks. The IAF also spends resources during basic training and screening. The program stresses technical education and quickly disenrolls those who cannot meet the screening's academic demands. This educational system supports the prevailing philosophy of emphasizing youthful aggressiveness over the educational gains netted through a college education [37:--] Other programs address the issue in a similar manner.

The USAF requirement for a college education is more based on tradition than a founded need for a college education to fly the aircraft in the inventory. [20:25] Several studies state there is no conclusive evidence behind the requirement for an advanced degree in order to be a successful pilot. A 1966 Logistics Management Institute study concluded "The requirement for the college degree for all such [pilot] candidates is questionable." [28:v] Also, a 1970 RAND symposium looking at the subject of pilot training and career progression concluded that "...a college education added little to a man's ability to manage aircraft." [20:24]

As a footnote to the standards discussion, it is noteworthy to mention the Israeli Air Force's unique recruitment policy to attract pilot training candidates. Although all the services recruit in the broadest sense, the Israeli AF program is the most extensive, beginning with youth activities and continuing on through high school. Although it can be argued Air Force Junior ROTC and Civil Air Patrol actions are recruiting methods, neither of these have as their primary goal to actively recruit pilot candidates.

In moving from screening standards to the flying training

screening programs arena, there are several divergent theories on program content, direction, and depth. The first area of review is testing. The screening programs all involve similar written aptitude test batteries, but some enter other dimensions. The Canadians test mental abilities and concentration through an oral mathematics exam. The intent is to place the candidate under stress and observe his mental sharpness. In addition to the aptitude test battery, the Royal AF expends resources developing and administering a series of laboratories to test the candidate's demonstrated mental and physical development in individual and group settings. The Israeli AF gets similar information on a candidate's mental and physical development in individual and group settings through exercises during the Army's basic and advanced training programs. These leadership skills exercises play an important role in the Israeli and the Royal Air Forces' screening systems.

Psychological screening efforts vary from program to program. All the services identified a need to determine the candidate's motivation, but different avenues were used to achieve the desired results. The Israeli AF not only conducts extensive psychiatric testing and interviews, but operates a rigorous mental and physical screening program to test the candidate's desire "...to stick with it." (37:--). The Royal Air Force conducts interviews with trained screening specialists to identify the candidate's motivation and personal profile. Aside from the IAF, few programs make use of psychological pen and paper tests to determine the candidate's motivation. The pen and paper tests are both difficult to develop and administer with standardized results. Leading industrial psychologists state that "...the use of personality and interest tests is fraught with problems that might preclude such tests having any practical utility." (1:186) The validity of personality and interest inventories or tests is elusive, and more research is required before they will accurately predict candidate motivation to successfully complete UPT (39:--).

In the area of psychomotor screening, the USAF has made great strides in developing its program. Although still in the validation phase, the advanced Portabat device is ahead of all the other psychomotor screening systems and holds the most promise.

The actual aircraft flying screening emphasis spans the range from no flying screening for the US Navy to a 63 hour program for the Royal AF. The flying syllabi also span the range of requirements from basic aircraft control in the West German, Israeli, and USAF programs to acrobatic and navigation proficiency in the Royal AF program. The prime drivers are monies available to fund the program, number of candidates to screen, and airframes available. An interesting note in this discussion is the small part flying screening plays in the

Israeli Air Force's program. With only 15 hours devoted to flying screening, this program is one of the lowest in overall hours of any program that includes flying. With otherwise such an extensive screening process, this seems to be an anomaly. The IAF philosophy, however, is that because the screening program is otherwise so extensive and rigorous, few resources need be expended on the flying screening portion of the program. [37:--] On the other end of the spectrum is the Royal Air Force with the 63 hour Chipmunk program. This recent innovation resulted from a conclusion drawn from a Royal AF review of their previous 14 hour Chipmunk screening program. The RAF found the short program did little more than eliminate candidates that could be identified as deficient by other screening system tests. They felt an expanded program would help them identify not only the high potential eliminees already otherwise identified, but also the low potential eliminees that would perform well in pilot training. [35:--]

The Canadian Forces and the US Navy do not conduct flying screening in the technical sense of the word. However, the Canadian Forces do introduce the student pilot to military aviation through a 27 hour Muskateer program. A review of their MIF reveals that the training emphasis is on the basics of stalls, spins, traffic patterns, and basic aircraft control, and includes aerobatics. [7:C1-C8] The US Navy's basic flying program is more parallel to the Royal Air Force's expanded Chipmunk program, stressing advanced maneuvers as well as the basics. [38:--] The diversity in flying screening hours is most likely attributed to the ongoing controversy about the effectiveness of flying screening in predicting UPT success. The short programs tend to identify only the outer edges of the performance spectrum (low and high potential eliminees). However, the actual numbers of high and low potential eliminees identified in a candidate pool is quite small, leaving a large number of candidates in the middle, neither identified as good or poor risks for completing UPT. Generally, the higher the flying hours available and the more involved the flying screening syllabus is the better the program identifies candidates as either a high or low potential eliminee, leaving fewer candidates unidentified. [39:--] A 1987 ROTC study supports this idea when they found a "...direct relationship between number of hours flown as a pilot prior to entering LATR and success at LATR. The more hours, the higher the pass rate - all the way to 100% pass rate for those with 40 hours or more experience." [22:Attach 1] Again, limiting factors of money, time, and flying resources shape the extent of the program. The more extensive the program, the higher it is in cost, time consumed, and opportunities lost to other endeavors. Since each service has its own unique set of variables to plug into the flying screening formula of money, people, time, and aircraft, so each service has tended to develop it's own flying screening syllabi.

The last focus area is the screening programs' timing to meet follow on pilot training demands. The more time separating the screening process from the training process, the larger the opportunity for contaminants to enter the system and affect the system's ability to properly predict success. [39:--] For this reason, most of the screening programs attempt to minimize the lag time between screening and training. Where there is a large lag, programs are modified. For example, the British UAS spreads its flying program over three years and includes 90 hours of flight instruction. Additionally, the UAS cadet concentrates only on flying while at the UAS and receives officer training only after graduation from their university and while attending IST. Of the three USAF screening systems, the one with the longest lag between screening and training also is the program with the highest attrition rate. [35:--] In FY87 ROTC UPT attrition was 42.9% vs OTS (36.9%) and USAFA (31.1%). In FY86 a similar trend occurred with UPT attrition rates running 33.8%, 27.4% and 22.7% respectively. The FY85 attrition trend paralleled the other two years with attrition rates of 29.1%, 18.6%, and 17.1%. [34:--] ROTC cadets screening lag may exceed two years in some cases, allowing contaminants such as medical problems, changes in career goals, motivational changes associated with changes in social status (marriage), and a host of other factors resulting in performance deficiencies leading to higher attrition rates. [35:--]

Chapter 6

RECOMMENDATIONS

There are six specific recommendations to improve the USAF's flying training screening process. They are derived from observations drawn during the research for this project. They include human factors research, flying screening syllabus changes, and training philosophy recommendations.

First, the USAF should research and develop a task inventory to scientifically determine what cognitive, physical and motivational attributes are required to successfully fly a military aircraft. This is a difficult and involved process. However, once an accurate pilot task inventory is developed, the process of identifying desired pilot behavior predictors and then creating tests screening for such behaviors would be based on firmer ground and make for a more successful and reliable screening program. Also, the pilot task inventory should be distinct from the officer qualities task inventory. Currently, the USAF pilot training screening process looks not only at pilot attributes, but officer qualities as well. Some of these officer qualities may not be critical for success as a military aviator.

Second, develop an accurate psychological screening system to predict motivation by identifying poor motivational risks. Determining a candidate's motivation is very important in predicting a training program's success. With UPT being a major adjustment to the average student in time, mental and physical sacrifices, and discipline, determining the candidate's motivational capacity would be of great benefit. Psychological screening should be expanded to better identify the motivational traits required to complete UPT and then develop systems to test and predict those traits in candidates. Also, while the psychological screening tests are developed and validated, increase the screening programs' difficulty, both mentally and physically, to help screen out poor motivational risks.

Hand in hand with this recommendation would be a proposal to cut to a minimum the time lag between the screening process and the training program. Particularly with the ROTC process, the predictive tests lose some of their value as the time span between screening and training increases. The more successful programs made screening an integral part of training, creating

minimal time lag.

Third, continue developing and validating the current USAF psychomotor screening program. This screening device holds great promise as an effective and efficient predictor of psychomotor skills. The Air Force Human Resources Laboratory strongly supports psychomotor screening as an effective screening tool in combination with pen and paper aptitude (AFQOT) tests. (25:18)

Fourth, expand the flying screening program. Overall, the services conducting expanded screening programs have better success in holding down attrition rates in follow on pilot training. The Royal Air Force is the best example of this expanded flying program. Although more costly in manpower and resources, the benefits, when applied to a large training program as the USAF's, could prove beneficial.

Next, examine the requirement for all candidates to have an advanced degree. Services with no advanced degree requirement compensate by integrating advanced academics in their screening programs. Primarily, they benefit by attracting a younger candidate, a candidate generally more motivated and healthier than older college graduate candidates. Leadership roles and career paths must undergo changes for this program to be effective.

Finally, conduct more low cost, short duration training during the screening programs. This additional training could take the form of survival, physiological, or parachute training. The added rigors would achieve two goals. First, it would consolidate training that ordinarily comes scattered throughout the UPT program. Also, an earlier attrition due to candidates' deficient performance in these added training requirements would cost the USAF less in time and money. An example would be discovering a candidate's medical problem during physiological training. Also, the additional training would support recommendation number two and would test the candidate's motivation to stick it out much like the Israeli AF's extended basic training/flight screening program currently serves as a motivation check.

The above recommendations, if undertaken, would improve the current USAF's flying training screening program in identifying high potential eliminees and preventing them from entering UPT. With less high potential eliminees in the training program, USAF UPT attrition should be reduced.

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